PATENT ABSTRACTS OF JAPAN

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(21)Application number : 08-246606 (71)Applicant : SHARP CORP

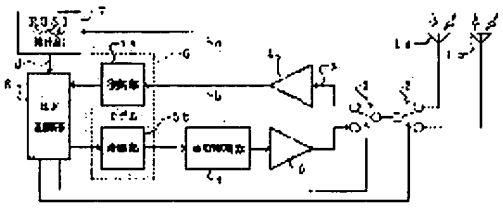
(22)Date of filing : 18.09.1996 (72)Inventor : NOCHIDA HITOSHI

(54) TRANSMISSION OUTPUT SAVING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To stably activate a power save function to prevent a radio wave interference or the like by saving transmission power required or over operated when an excellent communication state is ensured in a radio communication system.

SOLUTION: A plurality of antennas 1a, 1b with different gains are provided. When a reception electric field intensity detected therein is higher than a reference reception electric field intensity, the antenna 1a at a low gain is used and when smaller, the antenna 1b with a high gain is used to save power without adjusting the gain of a power amplifier 9.



LEGAL STATUS

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[Date of final disposal for application]

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the transmitting output economy system which aims at reduction of the transmitting output between a base transceiver station and a migration terminal unit, and the transmitting output between migration terminal units in radio communications systems, such as cellular system and PHS (Personal Handy-phone System).
[0002]
[Description of the Prior Art] The network of the radio which considered breadth, the base station, and the portable migration terminal unit as the basic configuration to the concept of enabling the concept of the early cordless telephone which made radio possible between the indoor main phone and the cordless handset to talk over the telephone easily by radio also on the outdoors is being built quickly in recent years.
[0003] in the above migration terminal units, in order to control the electromagnetic interference generated by the purpose of reduction of power consumption, simultaneously the electric wave in which oneself carries out outgoing radiation With the conventional migration terminal unit, carrying the power save function which a communication link condition controls in the stably securable range so that a transmitting output becomes small as much as possible in many cases As shown in drawing 2 , with the transceiver circuit changing switch 20 from input-signal a' obtained from an antenna 21 It is asking for the magnitude of RSSI level d' by the IF (Intermediate Frequency: intermediate frequency) amplifier 22 and the RSSI (Received Signal Strength Indicator: receiving display on the strength) level detecting element 23. This RSSI level has the voltage level according to received field strength, and the RF (Radio Frequency: radio frequency) control section 24 was operating the power save function by controlling the output equalization circuit 25 based on the value of RSSI level d', and adjusting the gain of power amplification 26.
[0004]
[Problem(s) to be Solved by the Invention] Although interference arises in the communication system using the above portable migration terminal units by the electric wave which was reflected in the building etc. or was diffracted, since the condition of interference is changed every moment by migration, change of communication environment, etc., it will continue being changed continuously, the level, i.e., the RSSI level, of the received field strength in a base station or a portable migration terminal. However, since it is difficult to control stably when changing an output by adjusting the gain of power amplification 26 like the above-mentioned conventional example, the problem that the output at the time of power save will become very unstable conjointly also with fluctuation of RSSI level is produced.
[0005] It was made in order that this invention might solve the above-mentioned trouble, and the purpose is in offering a stably maintainable transmitting output economy system about the output when performing power save according to the communication link condition of an electric wave to a radio communications system in case at least one side is a migration terminal unit.
[0006]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the transmitting output economy system concerning invention of claim 1 is equipped with two or more antennas which have mutually different gain, and an antenna change means, and is characterized by the change of a transmitting output being performed by the change of the antenna by the antenna change means. With the above-mentioned configuration, since the change of a transmitting output is performed by changing to the antenna with which sensibility differs, it is not necessary to adjust the gain of the difficult amplifier of adjustment, and the transmitting output after power save activation can be stabilized. For example, if the above-mentioned transmitting output economy system is applied to the migration terminal of mobile communications and the transmitting output at the time of power save is changed, since the transmitting output from a migration terminal can be stabilized, it will become possible to maintain the stable communication link condition.
[0007] In order that the transmitting output economy system concerning invention of claim 2 may solve the above-mentioned technical problem While two or more thresholds which classify the range of

detectable received field strength into the number of the above-mentioned antennas are memorized in addition to the configuration of claim 1 The range where received field strength is weaker is set up so that the high antenna of gain may be used. It is characterized by establishing the control means which controls an antenna change means so that the antenna set up to the detected received field strength is connected according to fluctuation of received field strength. By the above-mentioned configuration, when received field strength is strong and a distant office is in near Since it can communicate even if it reduces the transmitting output here, or it communicates by changing to an antenna with low sensibility, received field strength is weak and there is a distant office in the distance, a communication link situation like not being good When the transmitting output here is increased and it is necessary to communicate Without adjusting the gain by the side of amplifier, since it communicates by connecting with an antenna with high sensibility, so that transmission may not be performed with the transmitting output beyond the need Since a transmitting output can be changed, the communication device itself becomes possible [controlling stably the electromagnetic interference produced on the body of a communication device by the electric wave which carries out outgoing radiation].

[0008]

[Embodiment of the Invention] It will be as follows if one gestalt of operation of this invention is explained based on drawing 1 R> 1. Although the gestalt of this operation explains the configuration concerning transmitting output reduction of the migration terminal unit in a radio communications system, and the actuation at the time of the so-called power save, the following configurations and effectiveness are applicable also to a base station side.

[0009] As shown in drawing 1 , the transceiver circuit changing switch 3 which changes the antennas 1a and 1b with which gains differ mutually, the antenna circuit changing switch 2 which changes Antennas 1a and 1b, and a sending signal and an input signal to the above-mentioned migration terminal unit is formed. Moreover, IF amplifier 4 which outputs the RSSI signal showing the level of this electric wave while amplifying the received electric wave, While exchanging with the modem 5 which performs the strange recovery of a signal, and the voice transducer which does not illustrate the sending signal before a modulation, and the input signal after a recovery The RF control section 6 which controls the change timing of the above-mentioned antenna circuit changing switch 2 and the transceiver circuit changing switch 3, and the RSSI level detecting element 7 which detects the level of a RSSI signal based on the above-mentioned RSSI signal are formed.

[0010] Furthermore, the quadrature modulation machine 8 which performs quadrature modulation of the sending signal modulated from the modem 5, and the power amplification 9 which performs magnification for transmitting from the connected antenna are formed. However, in the above, antenna 1a shall have gain lower than antenna 1b. Moreover, although not illustrated, the voice transducer which has the ADPCM codec section, a microphone, a receiver, etc. is connected to the RF control section 6, and in the above-mentioned RF control section 6, timing control concerning the simple unknown episode processing accompanying voice conversion, scramble processing, and time-sharing transmission and reception etc. is performed.

[0011] Based on the above-mentioned configuration, the actuation at the time of power save of a migration terminal unit is explained. In drawing 1 , first, at the time of reception, while the received electric wave a which be chosen with the antenna circuit changing switch 2 and which shifted and was received by that antenna is sent to IF amplifier 4 with the transceiver circuit changing switch 3 and IF signal b is outputted, the RSSI signal c according to the field strength of the acquired received electric wave a is outputted. That is, the magnitude of received field strength can be known with the above-mentioned RSSI signal c. After getting over by recovery section 5a of a modem 5, IF signal b is sent to the RF control section 6, and is changed into voice through the ADPCM codec and receiver of a voice transducer which do not illustrate.

[0012] On the other hand, at the time of transmission, the sending signal changed from voice by the microphone and ADPCM codec of a voice transducer which are not illustrated is amplified in power amplification 9 to the output which can be transmitted, after being inputted into modulation section 5b of a modem 5 and carrying out quadrature modulation in the quadrature modulation machine 8 through

the RF control section 6. In addition, at the time of transmission, since the RF control section 6 has changed the transceiver circuit changing switch 3 to the transmitting side, a sending signal is discharged as an electric wave through the antenna connected to the antenna circuit changing switch 2. In the above, the RSSI signal c is inputted into the RSSI level detecting element 7, serves as the RSSI level d proportional to received field strength, and is inputted into the RF control section 6.

[0013] Although it has the threshold in comparison with the above-mentioned RSSI level d in the RF control section 6 While talking over the telephone by antenna 1a with lower gain, this threshold It is set as the RSSI level at the time of being received field strength (criteria received field strength being called hereafter) just before a noise, a sound piece, etc. are generated, and it is determined by the comparison result of the size of the RSSI level d and the threshold which were detected any of Antennas 1a and 1b are chosen. That is, if the RSSI level d is larger than this threshold at the time of reception, since current received field strength is stronger than criteria received field strength, it means that it is receivable even if it connects with low antenna 1a of gain. Moreover, since it means that this has a near distance with a distant office or a base station, or there are few obstructions, it means that it can communicate even if a transmitting output is low, and although it is desirable to lower a transmitting output in the range which can communicate, if it connects with low antenna 1a of gain as mentioned above, since a transmitting output declines inevitably, it does not need to adjust the gain of power amplification 9.

[0014] On the contrary, if the RSSI level d is smaller than this threshold, since current received field strength is weaker than criteria received field strength, it is necessary to connect with high antenna 1b of gain. Moreover, since distance with a distant office or a base station means that it is far or there are many obstructions in this case, send efficiency will increase and a transmitting output will improve if it connects with high antenna 1b of gain although it is necessary to raise a transmitting output, it is not necessary to adjust the gain of power amplification 9 too. Of course, it is necessary to adjust relation with a setup of received field strength, and the receiving sensibility of the migration terminal unit itself and the transmitting output used as the above-mentioned criteria so that it may be in the optimal condition.

[0015] As mentioned above, since it is not necessary to perform gain control of power amplification with difficult stable control by forming two or more antennas with which sensibility differs, performing easy control of changing the antenna connected according to received field strength, and changing a transmitting output, the transmitting output from power amplification can be stabilized. Consequently, it becomes possible to maintain the output at the time of power save stably.

[0016]

[Effect of the Invention] The transmitting output economy system concerning invention of claim 1 is equipped with two or more antennas which have gain which is mutually different as mentioned above, and an antenna change means, and is the configuration that the change of a transmitting output is performed by the change of the antenna by the antenna change means. So, the effectiveness of becoming possible to maintain the communication link condition stabilized after power save when applying, for example to mobile communications since it was not necessary to change a transmitting output by the gain adjustment of the difficult amplifier of adjustment and the transmitting output after the transmitting output changes at the time of power save etc. was stabilized is done.

[0017] As mentioned above, while in addition to the configuration of claim 1 the transmitting output economy system concerning invention of claim 2 classifies the range of detectable received field strength into the number of the above-mentioned antennas and memorizes it It is the configuration that the control means which controls an antenna change means so that the antenna which the range where received field strength is weaker is set up so that the high antenna of gain may be used, and was set up to the detected received field strength according to fluctuation of received field strength is connected is established. So, in order to change an antenna with the level of received field strength in addition to the effectiveness by the configuration of claim 1, it is changed into the suitable transmitting output according to a receiving situation, and since transmission is not performed with the transmitting output beyond the need, the effectiveness that the communication device itself becomes possible [controlling stably the electromagnetic interference produced on the body of a communication device by the electric

wave which carries out outgoing radiation] is done.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] The network of the radio which considered breadth, the base station, and the portable migration terminal unit as the basic configuration to the concept of enabling the concept of the early cordless telephone which made radio possible between the indoor main phone and the cordless handset to talk over the telephone easily by radio also on the outdoors is being built quickly in recent years.
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[Translation done.]

EFFECT OF THE INVENTION

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[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although interference arises in the communication system using the above portable migration terminal units by the electric wave which was reflected in the building etc. or was diffracted, since the condition of interference is changed every moment by migration, change of communication environment, etc., it will continue being changed continuously, the level, i.e., the RSSI level, of the received field strength in a base station or a portable migration terminal. However, since it is difficult to control stably when changing an output by adjusting the gain of power amplification 26 like the above-mentioned conventional example, the problem that the output at the time of power save will become very unstable conjointly also with fluctuation of RSSI level is produced. [0005] It was made in order that this invention might solve the above-mentioned trouble, and the purpose is in offering a stably maintainable transmitting output economy system about the output when performing power save according to the communication link condition of an electric wave to a radio communications system in case at least one side is a migration terminal unit.

MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the transmitting output economy system concerning invention of claim 1 is equipped with two or more antennas which have mutually different gain, and an antenna change means, and is characterized by the change of a transmitting output being performed by the change of the antenna by the antenna change means. With the above-mentioned configuration, since the change of a transmitting output is performed by changing to the antenna with which sensibility differs, it is not necessary to adjust the gain of the difficult amplifier of adjustment, and the transmitting output after power save activation can be stabilized. For example, if the above-mentioned transmitting output economy system is applied to the migration terminal of mobile communications and the transmitting output at the time of power save is changed, since the transmitting output from a migration terminal can be stabilized, it will become possible to maintain the stable communication link condition.

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[0012] On the other hand, at the time of transmission, the sending signal changed from voice by the microphone and ADPCM codec of a voice transducer which are not illustrated is amplified in power amplification 9 to the output which can be transmitted, after being inputted into modulation section 5b of a modem 5 and carrying out quadrature modulation in the quadrature modulation machine 8 through the RF control section 6. In addition, at the time of transmission, since the RF control section 6 has changed the transceiver circuit changing switch 3 to the transmitting side, a sending signal is discharged as an electric wave through the antenna connected to the antenna circuit changing switch 2. In the above, the RSSI signal c is inputted into the RSSI level detecting element 7, serves as the RSSI level d proportional to received field strength, and is inputted into the RF control section 6.

[0013] Although it has the threshold in comparison with the above-mentioned RSSI level d in the RF control section 6 While talking over the telephone by antenna 1a with lower gain, this threshold It is set as the RSSI level at the time of being received field strength (criteria received field strength being called hereafter) just before a noise, a sound piece, etc. are generated, and it is determined by the comparison result of the size of the RSSI level d and the threshold which were detected any of Antennas 1a and 1b are chosen. That is, if the RSSI level d is larger than this threshold at the time of reception, since current received field strength is stronger than criteria received field strength, it means that it is receivable even if it connects with low antenna 1a of gain. Moreover, since it means that this has a near distance with a distant office or a base station, or there are few obstructions, it means that it can communicate even if a transmitting output is low, and although it is desirable to lower a transmitting output in the range which can communicate, if it connects with low antenna 1a of gain as mentioned above, since a transmitting output declines inevitably, it does not need to adjust the gain of power amplification 9.

[0014] On the contrary, if the RSSI level d is smaller than this threshold, since current received field strength is weaker than criteria received field strength, it is necessary to connect with high antenna 1b of gain. Moreover, since distance with a distant office or a base station means that it is far or there are many obstructions in this case, send efficiency will increase and a transmitting output will improve if it connects with high antenna 1b of gain although it is necessary to raise a transmitting output, it is not necessary to adjust the gain of power amplification 9 too. Of course, it is necessary to adjust relation with a setup of received field strength, and the receiving sensibility of the migration terminal unit itself and the transmitting output used as the above-mentioned criteria so that it may be in the optimal condition.

[0015] As mentioned above, since it is not necessary to perform gain control of power amplification with difficult stable control by forming two or more antennas with which sensibility differs, performing easy control of changing the antenna connected according to received field strength, and changing a transmitting output, the transmitting output from power amplification can be stabilized. Consequently, it becomes possible to maintain the output at the time of power save stably.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the example of 1 configuration of the migration terminal unit concerning this invention.
[Drawing 2] It is the block diagram showing the migration terminal unit concerning the conventional transmitted power economy system.
[Description of Notations]
1a Antenna
1b Antenna
2 Antenna Circuit Changing Switch (Antenna Change Means)
3 Transceiver Circuit Changing Switch
4 IF Amplifier
5 Modem
5a Recovery section
5b Modulation section
6 RF Control Section (Control Means)
7 RSSI Level Detecting Element
8 Quadrature Modulation Machine
9 Power Amplification

Ref

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select < PAJ >

DERWENT-ACC-NO: 1998-278521

DERWENT-WEEK: 199825

TITLE: Transmitting output power saving system e.g. for cellular system, PHS - uses antenna selector switch to switch to low gain antenna when field strength is high or to high gain antenna when field strength is low

PATENT-ASSIGNEE: SHARP KK[SHAF]

PRIORITY-DATA: 1996JP-0246606 (September 18, 1996)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 10093503 A	April 10, 1998	N/A	004	H04B 007/26

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 10093503A	N/A	1996JP-0246606	September 18, 1996

INT-CL (IPC): H04B007/26

ABSTRACTED-PUB-NO: JP 10093503A

BASIC-ABSTRACT:

The system includes several antennae (1a,1b) with mutually differing gains. A selector switch (2), switches to the low gain antenna when received field strength is large. The large gain antenna is switched when field strength is low.

ADVANTAGE - Prevents electromagnetic interference.

CHOSEN-DRAWING: Dwg.1/2

TITLE-TERMS: TRANSMIT OUTPUT POWER SAVE SYSTEM CELLULAR SYSTEM

ANTENNA SELECT
SWITCH SWITCH LOW GAIN ANTENNA FIELD STRENGTH HIGH HIGH GAIN
ANTENNA FIELD STRENGTH LOW

DERWENT-CLASS: W01 W02

EPI-CODES: W01-B05A1A; W01-B05A1B; W02-C03C1A; W02-C03C3A; W02-C03E3;

SECONDARY-ACC-NO:
Non-CPI Secondary Accession Numbers: N1998-219429

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報**（Ａ）　(11)特許出願公開番号

特開平10－93503

(43)公開日　平成10年(1998)４月10日

(51)Int.Cl.[6]	識別記号	ＦＩ	
Ｈ０４Ｂ　7/26	１０２	Ｈ０４Ｂ　7/26	１０２

審査請求　未請求　請求項の数２　ＯＬ　（全４頁）

(21)出願番号　特願平8－246606

(22)出願日　平成８年(1996)９月18日

(71)出願人　000005049
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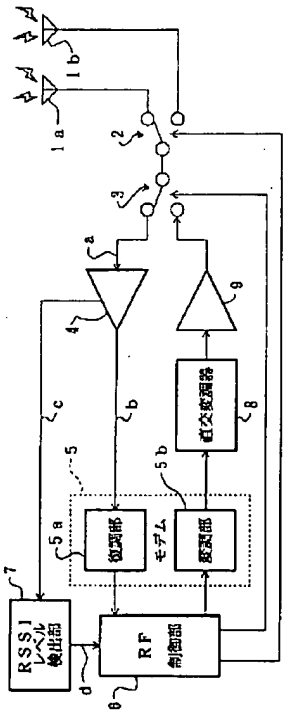
(74)代理人　弁理士　原　謙三

(54)【発明の名称】　送信出力節減装置

(57)【要約】

【課題】　無線通信システムにおいて、良好な通信状態が確保されているときに作動する、必要以上の送信電力を節減して、電波障害等を防止させるためのパワーセーブ機能を安定的に作動させる。

【解決手段】　利得の異なる複数のアンテナ１ａ、１ｂを設けて、検出した受信電界強度の大きさが、ある基準となる受信電界強度と比べて、大きいときには利得の低いアンテナ１ａを使用し、小さいときには利得の高いアンテナ１ｂを使用することにより、パワーアンプ９のゲインを調整することなく、パワーセーブを行う。



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【特許請求の範囲】
【請求項1】互いに異なる利得を有する複数のアンテナと、アンテナ切替手段とを備えており、送信出力の切り替えが、アンテナ切替手段によるアンテナの切り替えによって行われることを特徴とする送信出力節減装置。
【請求項2】検出可能な受信電界強度の範囲を上記アンテナの数に区分する複数の閾値が記憶されるとともに、受信電界強度の弱い範囲ほど、利得の高いアンテナが使用されるように設定されており、受信電界強度の変動に応じて、検出された受信電界強度に対して設定されたアンテナが接続されるようにアンテナ切替手段を制御する制御手段が設けられていることを特徴とする請求項1に記載の送信出力節減装置。
【発明の詳細な説明】
【0001】
【発明の属する技術分野】本発明は、セルラーシステムおよびPHS（Personal Handy-phone System)等の無線通信システムにおいて、例えば無線基地局と移動端末装置間での送信出力や、移動端末装置相互間での送信出力の節減を図る送信出力節減装置に関するものである。
【0002】
【従来の技術】屋内の親機と子機との間で無線通信を可能とした初期のコードレス電話のコンセプトは、屋外においても無線通信によって手軽に通話を行うことを可能とするというコンセプトへと広がり、基地局と携帯用の移動端末装置とを基本構成とした無線通信のネットワークが、近年急速に構築されつつある。
【0003】上記のような移動端末装置においては、消費電力の低減という目的と同時に、自らの出射する電波によって発生する電波障害を抑制するために、通信状態が安定的に確保可能な範囲で、できるだけ送信出力が小さくなるように制御するパワーセーブ機能を搭載していることが多く、例えば、従来の移動端末装置では、図2に示すように、送受信切替スイッチ20によって、アンテナ21より得られる受信信号a′から、IF(Intermediate Frequency:中間周波数）アンプ22とRSSI(Received Signal Strength Indicator:受信強度表示）レベル検出部23とによって、RSSIレベルd′の大きさを求めている。このRSSIレベルは、受信電界強度に応じた電圧レベルを有しており、RF(Radio Frequency：無線周波数）制御部24は、RSSIレベルd′の値に基づいて出力調整回路25を制御して、パワーアンプ26のゲインを調節することにより、パワーセーブ機能を作動させていた。
【0004】
【発明が解決しようとする課題】上記のような携帯用の移動端末装置を用いる通信システムでは、建物等で反射されたり回折されたりした電波によって干渉が生じるが、移動や通信環境の変化等によって干渉の状態が時々刻々変動するため、基地局あるいは携帯用移動端末における受信電界強度のレベル、すなわち、RSSIレベルも絶えず変動し続けることになる。しかしながら、上記従来例のようにパワーアンプ26のゲインを調整することによって出力を変化させる場合には、安定的に制御することが困難であるため、RSSIレベルの変動とも相まってパワーセーブ時の出力が非常に不安定になってしまうという問題を生じる。

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【0005】本発明は、上記の問題点を解決するためになされたもので、その目的は、少なくとも一方が移動端末装置である場合の無線通信システムに対し、電波の通信状態に応じて、パワーセーブを行うときの出力を安定的に維持可能な送信出力節減装置を提供することにある。
【0006】
【課題を解決するための手段】請求項1の発明に係る送信出力節減装置は、上記の課題を解決するために、互いに異なる利得を有する複数のアンテナと、アンテナ切替手段とを備えており、送信出力の切り替えが、アンテナ切替手段によるアンテナの切り替えによって行われることを特徴としている。上記の構成では、送信出力の切り替えを、感度の異なるアンテナに切り替えることにより行うため、調整の困難な増幅器のゲインを調整する必要がなく、パワーセーブ実行後の送信出力を安定させることができる。例えば、上記送信出力節減装置を移動体通信の移動端末に適用して、パワーセーブ時における送信出力の切り替えを行えば、移動端末からの送信出力を安定化できるから、安定した通信状態を維持することが可能となる。
【0007】請求項2の発明に係る送信出力節減装置は、上記の課題を解決するために、請求項1の構成に加えて、検出可能な受信電界強度の範囲を上記アンテナの数に区分する複数の閾値が記憶されるとともに、受信電界強度の弱い範囲ほど、利得の高いアンテナが使用されるように設定されており、受信電界強度の変動に応じて、検出された受信電界強度に対して設定されたアンテナが接続されるようにアンテナ切替手段を制御する制御手段が設けられていることを特徴としている。上記の構成により、受信電界強度が強く、相手局が近くにあるような場合には、こちらの送信出力を低下させても通信が可能であるから、感度の低いアンテナに切り替えて通信を行い、受信電界強度が弱く、相手局が遠くにある或いは通信状況が良好でない等のように、こちらの送信出力を増大させて通信する必要がある場合には、感度の高いアンテナに接続して通信を行うので、増幅器側のゲインを調整することなく、必要以上の送信出力で送信が行われないように、送信出力を切り替えることができるから、通信装置自身が出射する電波によって通信装置本体に生じる電波障害を安定的に抑制することが可能となる。
【0008】

【発明の実施の形態】本発明の実施の一形態について図1に基づいて説明すれば、以下のとおりである。本実施の形態では、無線通信システムにおける移動端末装置の送信出力低減、いわゆるパワーセーブ時の動作に係る構成について説明するが、以下の構成や効果は、基地局側にも適用することができる。

【0009】図1に示すように、上記移動端末装置には、互いに利得の異なるアンテナ1a、1bと、アンテナ1a、1bを切り替えるアンテナ切替スイッチ2と、送信信号と受信信号とを切り替える送受信切替スイッチ3とが設けられている。また、受信した電波を増幅するとともに、該電波のレベルを表すRSSI信号を出力するIFアンプ4と、信号の変復調を行うモデム5と、変調前の送信信号および復調後の受信信号を図示しない音声変換部とやり取りするとともに、上記アンテナ切替スイッチ2と送受信切替スイッチ3の切替タイミングを制御するRF制御部6と、上記RSSI信号に基づいて、RSSI信号のレベルを検出するRSSIレベル検出部7が設けられている。

【0010】さらに、モデム5からの変調された送信信号の直交変調を行う直交変調器8と、接続されたアンテナから送信するための増幅を行うパワーアンプ9とが設けられている。ただし、上記において、アンテナ1aはアンテナ1bより低い利得を有しているものとする。また、図示しないがRF制御部6には、ADPCMコーデック部、マイク、レシーバー等を有する音声変換部が接続されており、上記RF制御部6では、音声変換に伴う簡易秘話処理やスクランブル処理、時分割送受信に係るタイミング制御等も行っている。

【0011】上記構成に基づいて、移動端末装置のパワーセーブ時の動作を説明する。図1において、まず受信時には、アンテナ切替スイッチ2によって選択されたいずれかのアンテナによって受信された受信電波aが、送受信切替スイッチ3によってIFアンプ4に送られて、IF信号bが出力されるとともに、得られた受信電波aの電界強度に応じたRSSI信号cが出力される。すなわち、上記RSSI信号cによって、受信電界強度の大きさを知ることができることになる。IF信号bは、モデム5の復調部5aによって復調された後、RF制御部6に送られ、図示しない音声変換部のADPCMコーデックおよびレシーバーを介して音声に変換される。

【0012】一方、送信時には、図示しない音声変換部のマイクおよびADPCMコーデックによって音声から変換された送信信号はRF制御部6を介して、モデム5の変調部5bに入力され、直交変調器8において直交変調された後、パワーアンプ9において、送信可能な出力まで増幅される。なお、送信時にはRF制御部6が、送受信切替スイッチ3を送信側に切り替えているので、アンテナ切替スイッチ2に接続されているアンテナを介して送信信号が電波として発射される。上記において、RSSI信号cはRSSIレベル検出部7に入力されて、受信電界強度に比例したRSSIレベルdとなり、RF制御部6に入力される。

【0013】RF制御部6では、上記RSSIレベルdと比較する閾値を有しているが、この閾値は、利得の低い方のアンテナ1aによって通話を行っているときに、ノイズや音切れなどが発生する直前の受信電界強度（以下、基準受信電界強度と称する）のときのRSSIレベルに設定されており、アンテナ1aおよび1bのいずれを選択するかは、検出されたRSSIレベルdと閾値との大小の比較結果によって決定される。すなわち、受信時において、該閾値よりRSSIレベルdが大きければ、基準受信電界強度よりも現在の受信電界強度が強いので、利得の低いアンテナ1aに接続しても受信が行えることを意味する。また、このことは、相手局もしくは基地局との距離が近いか、障害物が少ないことを意味するので、送信出力が低くても通信が行えることを意味し、通信が可能な範囲で送信出力を下げることが好ましいが、上記のように利得の低いアンテナ1aに接続すれば、送信出力は必然的に低下するから、パワーアンプ9のゲインを調整する必要はない。

【0014】逆に、該閾値よりRSSIレベルdが小さければ、基準受信電界強度よりも現在の受信電界強度が弱いので、利得の高いアンテナ1bに接続する必要がある。またこの場合には、相手局もしくは基地局との距離が遠いか、障害物が多いことを意味するので、送信出力を上げる必要があるが、利得の高いアンテナ1bに接続すれば、送信効率が上がり送信出力が向上するから、やはりパワーアンプ9のゲインを調整する必要はない。もちろん、上記基準となる受信電界強度の設定や、移動端末装置自体の受信感度と送信出力との関係を最適な状態となるように調整しておく必要がある。

【0015】上記のように、感度の異なる複数のアンテナを設け、受信電界強度に応じて接続するアンテナを切り替えるという簡単な制御を行って、送信出力を変更することにより、安定的な制御が難しいパワーアンプのゲイン制御を行う必要がないので、パワーアンプからの送信出力を安定させることができる。この結果、パワーセーブ時の出力を安定的に維持させることが可能となる。

【0016】

【発明の効果】請求項1の発明に係る送信出力節減装置は、以上のように、互いに異なる利得を有する複数のアンテナと、アンテナ切替手段とを備えており、送信出力の切り替えが、アンテナ切替手段によるアンテナの切り替えによって行われる構成である。それゆえ、送信出力の切り替えを、調整の困難な増幅器のゲイン調整によって行う必要がないため、パワーセーブ時等の送信出力切り替え後の送信出力を安定させることができるので、例えば移動体通信に適用すれば、パワーセーブ後においても、安定した通信状態を維持することが可能となるとい

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う効果を奏する。

【００１７】請求項２の発明に係る送信出力節減装置は、以上のように、請求項１の構成に加えて、検出可能な受信電界強度の範囲を上記アンテナの数に区分して記憶するとともに、受信電界強度の弱い範囲ほど、利得の高いアンテナが使用されるように設定されており、受信電界強度の変動に応じて、検出された受信電界強度に対して設定されたアンテナが接続されるようにアンテナ切替手段を制御する制御手段が設けられている構成である。それゆえ、請求項１の構成による効果に加えて、アンテナの切替を受信電界強度のレベルによって行うため、受信状況に応じた適切な送信出力に変更され、必要以上の送信出力で送信が行われないので通信装置自身が出射する電波によって通信装置本体に生じる電波障害を安定的に抑制することが可能となるという効果を奏する。

【図面の簡単な説明】

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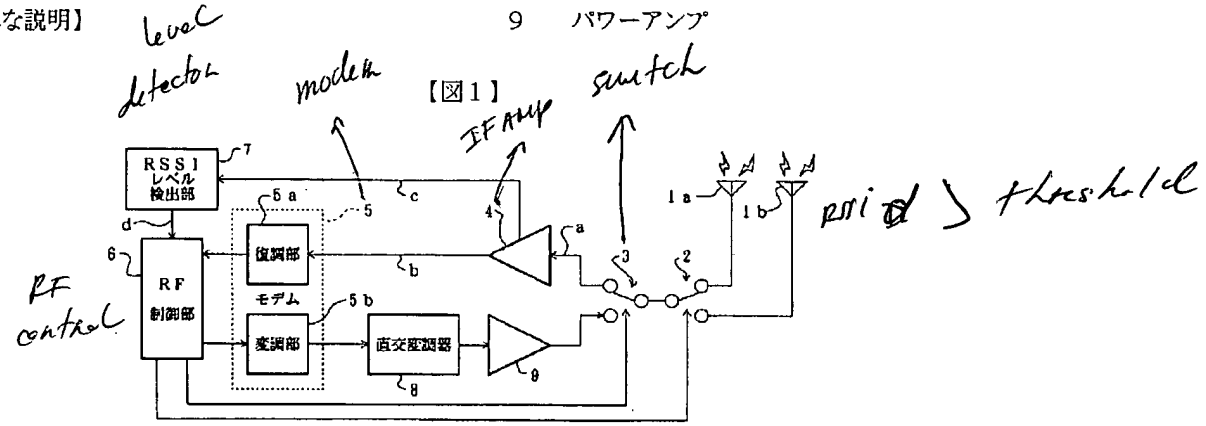
【図１】本発明に係る移動端末装置の一構成例を示すブロック図である。

【図２】従来の送信電力節減装置に係る移動端末装置を示すブロック図である。

【符号の説明】

１ａ　アンテナ
１ｂ　アンテナ
２　アンテナ切替スイッチ（アンテナ切り替え手段）
３　送受信切替スイッチ
４　ＩＦアンプ
５　モデム
５ａ　復調部
５ｂ　変調部
６　ＲＦ制御部（制御手段）
７　ＲＳＳＩレベル検出部
８　直交変調器
９　パワーアンプ

【図１】



【図２】